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USING HIGH-PROBABILITY FOODS TO INCREASE THE ACCEPTANCE OF LOW-PROBABILITY FOODS

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Studies have evaluated a range of interventions to treat food selectivity in children with autism and related developmental disabilities. The high-probability instructional sequence is one intervention with variable results in this area. We evaluated the effectiveness of a high-probability sequence using 3 presentations of a preferred food on increasing acceptance in a child with autism who refused a few specific foods. The high-probability sequence increased acceptance of 3 foods. We then systematically faded the intervention for 2 foods.

Key words: antecedent manipulations, behavioral momentum, fading, food selectivity, high-probability sequence

One antecedent intervention that has received relatively little attention in the feeding disorders literature is the high-probability (high-*p*) instructional sequence. The high-*p* sequence involves instructing an individual to engage in a task for which there is a high likelihood of compliance just prior to instructing that individual to complete a task with which he or she is not likely to comply. Results of feeding research on this strategy have been inconsistent. For example, Dawson et al. (2003) evaluated the high-*p* sequence with a 3-year-old girl who engaged in total food refusal and found that the high-*p* sequence alone did not increase food acceptance. Food acceptance increased when escape extinction also was used. However, the high-*p* instruction (e.g., touch ear) was dissimilar to the low-*p* instruction (take a bite of food).

Patel et al. (2006) evaluated the effects of adding the high-*p* sequence to escape extinction for two children, one with total food refusal and one with food selectivity, and found that the addition of the high-*p* sequence increased acceptance for both participants and decreased problem behavior for the child with food refusal. In addition, Patel et al. compared the high-*p* sequence combined with escape extinction to escape extinction alone with a 2-year-old girl who received 100% of her nutritional needs via gastrostomy tube. The high-*p* sequence alone was ineffective, escape extinction alone improved acceptance but had no effect on problem behavior, and the high-*p* sequence combined with escape extinction increased acceptance and also decreased problem behavior. Patel et al. (2007) evaluated the high-*p* sequence in the absence of escape extinction with a 4-year-old boy who engaged in food selectivity and no problem behavior and found that acceptance immediately increased from 0% to 100%. Interestingly, Patel et al. (2006, 2007) used high-*p* tasks (e.g., presentations of an empty spoon) that were topographically similar to the low-*p* task (e.g., presentations of food on spoon). However, to our knowledge, taking bites of preferred foods has not yet been used as the high-*p* task.

This study was Aimee Meier's MA thesis at the Chicago School of Professional Psychology.

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The goals of the current study were to extend this line of research in the following ways: (a) to further examine the effects of the high-*p* sequence in the absence of escape extinction; (b) to use a topographically similar high-*p* task involving a preferred food; (c) to fade the intervention systematically; (d) to evaluate the intervention in a home-based natural setting; and (e) to apply the procedure with a child who ate many foods but refused to eat a few specific foods targeted for treatment.

METHOD

Participant, Setting, and Materials

Ronee, a 3-year-old girl with autism, participated in the study. Her parents reported that she was a picky eater and frequently refused to eat fruits and vegetables. For example, Ronee shook her head, said "no," and turned her head away when nonpreferred foods were presented. However, these behaviors were not difficult for her parents to manage, and they rarely occurred during the analysis. Ronee received early intervention services, and a trained therapist conducted all sessions in her home at the dining room table. Ronee sat in a regular-sized chair, was a self-feeder, and used a regular fork or spoon. She did not have difficulty chewing or swallowing foods after they had been accepted. Sessions were conducted three to five times per week, and one to two 10-trial blocks were completed per session. Sessions were conducted during Ronee's regular snack times, which were no less than 1 hr after her last meal.

Data Collection and Interobserver Agreement

Observers collected pencil-and-paper data on acceptance for low-*p* and high-*p* foods. *Acceptance* was defined as Ronee picking up the fork or spoon and putting the food in her mouth within 6 s of the instruction with no subsequent occurrence of expulsion (i.e., spitting out the food). During each session, we calculated the percentage of acceptance for both high-*p* and low-*p* foods by dividing the number of presentations with acceptance by the total number of presentations of the high-*p* or low-*p* food and converting this ratio into a percentage. Sessions were videotaped, and a second observer independently scored 48% of the sessions. Interobserver agreement was calculated by dividing the number of agreements for each of the 10 trials for each session by the total number of agreements plus disagreements and converting this to a percentage. We considered an agreement as both observers agreeing on the occurrence of acceptance for the entire high-*p* low-*p* sequence. Mean total interobserver agreement for acceptance was 99.7% across all conditions (range, 90% to 100%).

Design and Procedure

We evaluated the effectiveness of the high-*p* sequence using nonconcurrent multiple baseline and reversal designs. Ronee's parents identified plums, raspberries, and eggplant as foods that the family ate but Ronee refused. We used these foods as the low-*p* foods.

Ronee's parents identified bananas and baked beans as foods that she consumed consistently. Thus, we determined whether we could use these foods as high-*p* foods with a compliance assessment. During the assessment, the therapist conducted two 10-bite sessions for each food, presenting one food in each session. The therapist presented the bite on a utensil on a plate in front of Ronee and provided the verbal prompt to "take a bite." Verbal praise was provided for acceptance, and another bite was presented after 3 to 5 s. Ronee accepted the bananas and baked beans on 100% of presentations; therefore, we used these foods in treatment.

During baseline, only low-*p* foods were presented, and sessions consisted of 10 bites or trials of the same food. All foods were presented in their regular texture (approximately 1 to 1.5 cm cubed). To begin a trial, the therapist placed the utensil with the low-*p* food on Ronee's plate with the instruction to "take a bite." After acceptance, the therapist waited approximately 15 s to begin the next trial. If Ronee did not accept the bite within 6 s of the instruction, pushed the plate away, or said "no," the therapist removed the plate and began the next trial after approximately 15 s. Brief praise (e.g., "nice eating") was provided for acceptance, and expelled bites were ignored.

During the high-*p* sequence treatment, the therapist presented three bites of high-*p* foods, one at a time, followed by one bite of the low-*p* food. Thus, each trial consisted of four bites, for a total of 40 bites per session. We conducted low-*p* and high-*p* bite presentations in the same manner as in baseline, with a few exceptions. The therapist waited approximately 3 to 5 s between high-*p* bite presentations. Ronee had very efficient chewing skills, and this interval was based on her pace of eating. Mean length of the entire sequence was approximately 15 s, with about 15 s between trials. We used banana as the high-*p* food for plums and raspberries, and we used baked beans as the high-*p* food for eggplant. We chose to pair baked beans with the eggplant because this was a more naturally occurring food combination. Brief verbal praise was provided following acceptance of both high-*p* and low-*p* foods. If acceptance of low-*p* foods was at 80% or higher for three consecutive sessions, we reduced the number of high-*p* bite presentations by one systematically (i.e., two bites of high-*p* food: one bite of low-*p* food; one bite of high-*p* food: one bite of low-*p* food) until the high-*p* sequence was completely removed; as a result, trial length varied throughout this process. When acceptance was at 80% or higher for three consecutive sessions in the absence of the high-*p* sequence, we discontinued the intervention and conducted a follow-up session without the high-*p* sequence 12 days and 15 days after the last session for plums and raspberries, respectively.

RESULTS AND DISCUSSION

Figure 1 depicts Ronee's acceptance of low-*p* foods. For plums, acceptance was 10% during each baseline session. When the high-*p* sequence intervention was implemented, mean acceptance of plums increased to 93% (range, 80% to 100%). During the reversal to baseline, mean acceptance decreased to 53% (range, 10% to 100%). After reintroduction of the high-*p* sequence, mean acceptance increased to 98% (range, 90% to 100%). The intervention then was faded by systematically reducing the number of high-*p* bites in the sequence. During follow-up, Ronee's acceptance of plums was 100%. With raspberries, mean acceptance was low during baseline (M =10%; range, 0% to 30%) and increased to 97% (range, 90% to 100%) afer the high-*p* sequence was introduced. The intervention was faded successfully, and the high-*p* sequence was removed completely with acceptance at 100%. Moreover, these results were maintained at follow-up. For eggplant, acceptance was low during baseline (M = 12%; range, 10% to 20%) and improved when the high-*p* sequence was introduced, with acceptance of the low-*p* food averaging 67% (range, 10% to 100%). Although we attempted to reduce the high-*p* bite presentations to two, we were not able to accomplish the first step of fading because acceptance decreased. Acceptance of high-*p* foods was 100% across all foods (data available from the second author).

These data extend the feeding literature in several ways. First, the high-*p* sequence effectively increased acceptance of all three nonpreferred foods in the absence of escape extinction. These results are consistent with those of Patel et al. (2007), who also found the high-*p* sequence to be effective in the absence of escape extinction. Second, the intervention involved high-*p* foods and might be considered a relatively novel variation of the high-*p* sequence. Third, the high-*p* sequence was faded effectively for two of the three foods. Fourth, the intervention was conducted in the home setting. Finally, the intervention was implemented with a child with autism who consumed a variety of foods, but who had a few specific targets for feeding intervention. Patel et al.'s study involved a selective child who did not engage in problem behavior during feeding and

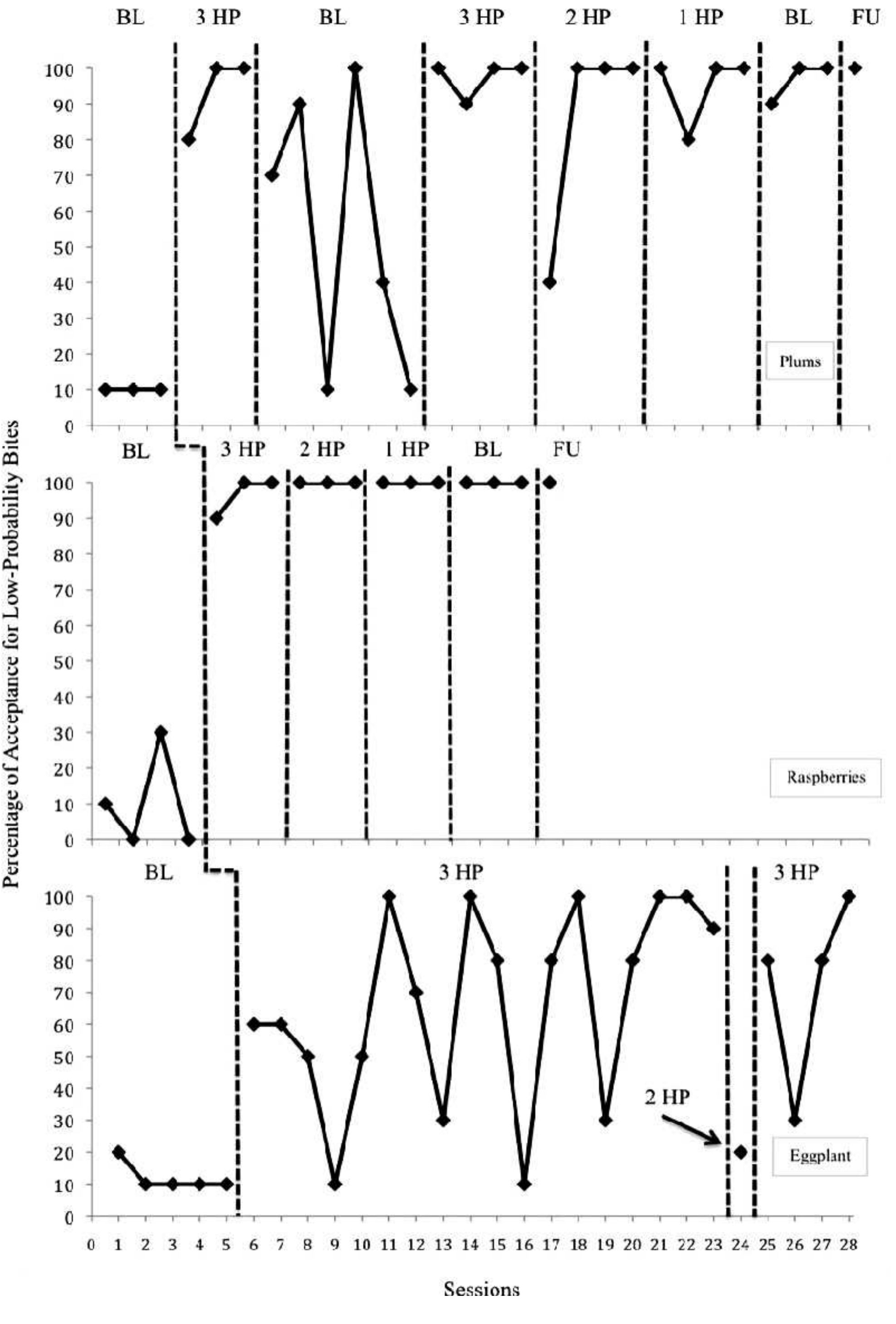

Figure 1. Percentage of acceptance of bites across low-probability foods during baseline (BL) and high-probability treatment (HP) phases. FU = follow-up.

exhibited a less severe feeding difficulty. The current study also supports the hypothesis that the high-*p* sequence may be more effective in the absence of escape extinction for children with less severe feeding difficulties.

As an antecedent-based intervention, the high-*p* sequence was easy to implement. Ronee's parents reported that they would be comfortable implementing this intervention on their own. Furthermore, although parent training was not conducted, Ronee's parents reported that she began eating the three foods in natural settings after the experiment, and they also observed generalization to other previously nonpreferred foods (e.g., other fruits).

Several limitations must be noted. First, we did not collect data on procedural integrity. Second, naturally occurring motivating operations may have altered the effectiveness of the high-*p* sequence. In the current study, the only measure taken to control this variable was a requirement that the child not consume any food for at least 1 hr before the session. Third, because we did not conduct probes prior to each phase of the fading sequence, the extent to which fading was necessary or could have been implemented more quickly is unknown. Fourth, we did not conduct formal generalization probes. Thus, objective information about generalization is not available. In addition, we increased acceptance of only three foods. Finally, because the high-*p* sequence involves relatively rapid bite presentations, the procedure may be less appropriate with high-*p* foods that are of a higher texture if a child has inadequate chewing skills or difficulty swallowing.

The high-*p* procedure employed in this study might be considered to be a variation of the sequential presentation method (e.g., Piazza et al., 2002), and the success of these feeding interventions may be a product of stimulus–stimulus pairings and subsequent function transfer. Therefore, the lack of a full reversal with the first food may have been the result of a relatively short history of stimulus–stimulus pairings (three 10-trial blocks). Moreover, it is possible that a difference in hierarchy of preference may have contributed to the difference observed between the banana as a high-*p* food and the baked beans as a high-*p* food. Although both foods were identified as high-*p* foods through the compliance assessment and were recommended by the parents as being highly preferred, a preference assessment was never conducted. Thus, it is possible that bananas were a more preferred food. Similarly, it is possible that eggplant was relatively less preferred than the plums and raspberries; thus, the differential success of the intervention could possibly be attributed to differences in preference for the targeted foods. Future research should evaluate these possibilities. Although Patel et al. (2007) also used a topographically similar high-*p* response, the extent to which this aspect of the high-*p* sequence is critical for success is still unknown. Thus, future research should continue to examine the circumstances in which less intrusive, antecedent-based strategies are most effective.

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